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REPORT OF THE COUNCIL.

MAY 26, 1885.

During the last year the Academy has lost by death eleven members;—viz. five Resident Fellows: Samuel Cabot, George B. Dixwell, Henry L. Eustis, Robert W. Hooper, Edward Jarvis; two Associate Fellows: Alpheus S. Packard, Benjamin Silliman; and four Foreign Honorary Members: George Bentham, Karl R. Lepsius, Mark Pattison, and Carl T. E. von Siebold.

RESIDENT FELLOWS.

HENRY LAWRENCE EUSTIS.

HENRY LAWRENCE EUSTIS was born at Fort Independence, in Boston Harbor, on the 1st of February, 1819. His father, Brigadier-General Abraham Eustis, of the United States Army, was graduated from Harvard College in 1804, and received his final title in the regular army in 1834; his mother, who died when he was two years old, was Rebecca, daughter of Dr. John Sprague of Dedham, Mass.

At the age of seven, he was sent to Lancaster Academy, and thence to Stow; he was afterward placed at a boarding school directly opposite West Point. At the age of fifteen he entered Harvard College, and graduated with honors, receiving an oration as his part at Commencement.

He immediately entered the United States Military Academy at West Point, where he at once took the highest rank, and while still a cadet was employed as assistant instructor. He graduated at the head of his class, and in virtue of his scholarship entered the Engineer Corps, receiving his commission as Second Lieutenant in 1842, and entering upon his duties as assistant to the Chief of Engineers at Washington.

In the summer of 1843, he was ordered to Boston as assistant to Colonel Thayer, and served as assistant engineer in the construction of the sea-wall at Lovell's Island, and at Fort Warren in Boston Harbor. From 1845 to 1847, he was the engineer in charge of the works for the improvement of Newport Harbor, consisting of Fort Adams and Goat Island pier, dike, and lighthouse.

From August, 1847, to November, 1849, he was Assistant Professor of Engineering at the United States Military Academy at West Point. This position he resigned to accept the Professorship of Engineering in the Lawrence Scientific School, which had recently been founded.

In 1861 he spent eight months in travelling in Europe for the benefit of his health.

The War of the Rebellion broke out during his absence, and soon after his return, early in March, 1862, he was awakened one night, some hours after retiring to sleep, by the violent ringing of his door-bell. His untimely visitors proved to be Governor Andrew and others, who had come to tell him of the success of the Confederate ram, the Merrimack, and to ask his advice, as an officer of the Engineers, as to the necessity of preparing Boston for the approach of this apparently invincible iron-clad. Soon after this he offered his services to the Governor, and was commissioned Colonel of the 10th Massachusetts Volunteers, August 15, 1862.

His regiment served with the Army of the Potomac in the Maryland campaign from September to November, 1862, being engaged at Williamsport, guarding the Upper Potomac fords, and in the march to Falmouth, Va.; — in the Rappahannock campaign, from December, 1862, to June, 1863, being engaged in operations at the battle of Fredericksburg, the storming of Marye's Height, the battle of Salem, and the passage of the Rappahannock; — in the Pennsylvania campaign, June and July, 1863, being engaged, after a forced march of thirty-five miles, in the battle of Gettysburg, and in the pursuit of the enemy to Warrington, Va.

He was appointed Brigadier-General, September 12, 1863, and took part in the operations in Central Virginia from November, 1863, to March, 1864; being engaged in the combat at Rappahannock Station, Mine Run, and in the march toward Charlottesville and back; — in the Richmond campaign, being engaged in the battle of the Wilderness, the battles around Spottsylvania, and those of Cold Harbor.

General Eustis resigned his command, June 27, 1864, and resumed his duties in the Scientific School with the academic year 1864-65. At this post he remained till his death, there being but six in the active

service of the University whose names, arranged in the order of collegiate seniority, preceded his in the roll of the officers of instruction and government.

During the past two years Professor Eustis had been known to be in failing health. Unwilling, however, to relinquish his classes, his devotion to which was most uncommon, he was forced to ride the short distance to the School, and finally to have his students come to him. At last, however, his strength failed, his physicians sent him to Fernandina, and his return was the result of the knowledge that death was inevitable and near at hand. On Sunday morning, January 11, 1885, he died at his residence in Cambridge, greatly lamented by all his friends and pupils.

Professor Eustis contributed to the *Memoirs of this Academy* a paper on the Tornado of August 27, 1851. The following brief extract from this paper forcibly illustrates the condition of Meteorology at that time, as contrasted with its present advanced state.

“The work of furnishing the material which shall, when properly elaborated, form the solid and enduring structure of the true science of meteorology is hardly begun. Storms of more or less violence are constantly occurring, but they come without warning, and leave behind them evidences, not only of their own desolating power, but of man’s ignorance, which prevented him from anticipating and guarding against them. How many millions of dollars, and how many valuable lives, would be annually saved if we had that precise knowledge which could tell us with the voice of recognized authority that the storm is approaching, and that the ship which we are so joyfully cheering on her way is doomed to destruction if she leave the port! Nay, more, we may deny even the possibility of prediction, and assume merely a knowledge of the mode and sphere of action of storms, and even this shall enable the mariner to direct his course with judgment and escape their fury, instead of running, under false theories, into the very vortex of ruin. If the storm be not a solitary exception to those general laws which govern our physical world, — laws whose beauty, harmony, universality, and mutual dependence Science is every day more and more demonstrating, — then it is not unreasonable to suppose that the time will come when its laws shall be so far made known that the wayfarer on the mighty deep shall be able to escape from the approaching hurricane, with the same certainty and decision with which we now move out of the track of the rushing locomotive engine.”

His description of the path of the tornado is given as follows : —

“Emerging from a thicket of forest growth, near the foot of Wel-

lington Hill, in Waltham, the storm crosses an open meadow, and commences the ascent of the hill. Then it passes along the crest of the hill, meeting in its way houses and barns, orchards, cornfields, fences, and forests. Now it commences its descent, and, as if gathering fresh strength at each obstacle, flies with resistless violence through the town beneath, bathes its weary wings in the waters of Spy Pond, cools its feverish breath by the demolition of an ice-house, and with renewed vigor speeds its way through the heart of West Cambridge, over the plain to the Mystic River."

This paper was accompanied by a map of the path on a scale of an inch to one hundred feet: it indicated the position of every tree as determined by two rectangular co-ordinates, and also the direction in which it lay upon the ground. A mere glance at the map shows that the trees point inward toward the axis of the path, so that at almost any point a person may put his finger on the axis line. Nothing was, however, put down on the map which did not present itself in the actual survey, thus leaving everything open to the theories of others.

We now come to Professor Eustis's most important work, a work which has endeared him to a great body of scientific men, professors, and engineers, who owe their success in life to his skilful and devoted labors as a teacher. He was said to be a recluse during the latter part of his life, but the truth is, he devoted all his leisure time to the systematic preparation and arrangement of his instruction.

The method of this instruction is thus described by Professor Whitaker:—

"I cannot say too much of the interesting, valuable, and systematic method by which Professor Eustis has reduced the necessary routine of his work to a minimum, and economized the time of his students in the class-room, insuring the attention of successive classes to the same carefully selected fundamental points, and the thorough examination of the students as a part of the teaching, without dispensing with, or losing to any extent, the advantageous results of oral teaching.

"Without going very much into detail, I may say that for each subdivision of the subjects taught by him he has prepared a number of examination questions which frequently are problems requiring solution. Those questions belonging to any one subdivision are of the same grade, and they are practically interchangeable, so that they may, without especial selection, be handed to the different members of the class for solution. Furthermore, they are not to be found in the usual text-books, and cannot therefore be solved from memory. They require that the students shall exercise both their wits and their

mathematical skill. They also require that they shall understand the principles involved sufficiently well to solve the problems readily. The different problems are written upon cards which are similar to those used in library catalogues. The correct solutions of the problems are written upon similar cards, and both the questions and the answers are filed away in proper cases, and in the order in which they are to be used. The Professor is accustomed to meet his classes for several successive exercises, the number of them depending upon the nature of the principles that are to be considered. During these exercises he makes such explanations and suggestions as in his judgment are necessary, in order that the students may understand this entire subdivision of the subject, without questioning them often, but always giving them an opportunity to question him. At the conclusion of each of such a series of lectures, he hands some card of the proper set to each student for solution. The solved answers enable an accurate examination of the results obtained by the students to be rapidly made. The promptness, certainty, and accuracy with which all this is done are very noteworthy. It would be very greatly to the advantage of students if this method of instruction should become wide-spread, instead of exceptional."

It would be beyond the scope of this notice to describe, or even to enumerate, the problems upon the cards above mentioned, or the admirable series of manuscript notes of which his students made such liberal use. I have, however, thought it best to append the following extracts from letters written by two of Professor Eustis's former students, showing their affection for him as a man and their admiration of him as a teacher.

"In this busy community we often fail to express our appreciation of the efforts and labors of those who have left us, having finished their work in this world. In expressing the debt I owe to Professor Eustis, I am sure that I can also speak for scores of men in varied pursuits, scattered over this continent, who will join with me in a grateful and loving tribute.

"Thirty years ago I came to Harvard University full of a desire for a scientific education, albeit somewhat disheartened by never having been stimulated by a great teacher. I shall never forget my first recitation to Professor Eustis. Having learned my lesson and delivered it in what I considered a perfect manner, I was surprised by a sharp thrust from the gentlemanly man, with military yet modest bearing, who presided over the section. This thrust completely demolished my superficial and egotistical structure, and showed

me where I was weak. He taught me, as no one ever had before, what was true economy in teaching and intellectual effort. I grew to appreciate and love the man who gave the best powers of an unusually strong and disciplined mind to correcting the intellectual processes of a green lad. He taught with his whole body and soul, and, even in these latter days, while occupying a lecture-room near his, I have heard him for two hours at a stretch arguing with those who, convinced, could argue still, turning the subject about with masterly skill so that no one should leave his presence with a muddled brain. There was something pathetic in the tones of that voice, not cushioned by any indolent tutor's ease. There was no space between that voice and the heart. The whole man spoke with it. That voice has literally been worn out in the service of the University for more than a quarter of a century; yet the man was not old. While other men achieved popular reputations with, in many cases, a minimum attention to college classes, Professor Eustis gave always his best to those who attended his recitations. His work, silent and unobserved by the world at large, has borne great fruit; for there are hundreds in America occupying prominent positions, trained by him, who will rise up and call him blessed."

"The late Professor Eustis, was a man whose excellence as an instructor deserves public acknowledgment from his pupils. The quality of his teaching was exceptional. The bent of his mind and the thoroughness of the old West Point discipline made him intolerant of half training or superficial knowledge. The early practice of his profession, and afterward constant reading of its literature, kept him up to the level of its best attainment; and he had a lively contempt for the makeshifts and rules of thumb by which many professional men and some instructors try to handle the results of knowledge without the understanding of it. At the same time he could do justice to that native instinct for construction which he called *gumption*, and which in rare instances—much rarer, probably, than is believed—proves a safe bridge for minds for which formulæ have no meaning. His most characteristic qualities were his rare clearness and directness of mind. These, with his freshness and power of presentation, made his teaching luminous, filling any but a very laggard pupil with interest in his subject, and making the way plain. It was a maxim with him that clear thought made clear speech; he would not admit that any one who had a distinct idea should be unable to find distinct expression for it. There could be no better enforcement of this doctrine than the lucidity of his own explanations. He

always went behind his text-books, and it was seldom that he did not let light into the mind of his pupil.

“The charm of a straightforward and genial manner won the confidence of his pupils even before they felt the mastery of his teaching. This made him unusually accessible and correspondingly popular. Interest in the music of the students added to this accessibility. He had been an early leader of the Pierians, and was the one of the instructors to whom years ago the musical clubs would go with a serenade, and be sure of a hearty welcome. So to the friends who attended his funeral there was a fitting touch of pathetic association in the sound of the young men’s voices which sang the familiar hymn.”

EDWARD JARVIS.

EDWARD JARVIS, the son of Francis and Melicent Jarvis, was born at Concord, Mass., January 9, 1803. His parents were persons of high character, both as to intelligence and as to moral worth; and Concord, early in this century, was as remarkable for the strong staple of its manhood and womanhood as it has been of late years for its literary and philosophical culture. Rev. Dr. Ripley and Samuel Hoar were only the best known of a cluster of professional men who not only gave reputation to the town, but exerted a controlling influence over the young people that grew up around them, so that for many years a certificate of birth in Concord was little less than a guaranty of respectable ability and substantial merit. Jarvis was fitted for Harvard College in part at Concord, and in part at the Westford Academy, and graduated in 1826. In college he was a thorough and faithful student, held a good rank in his class, and won only respect and affection from all who were in any way associated with him.

After graduating, he taught school for a little while in Concord, commencing at the same time his medical studies under the tuition of Dr. Bartlett. He afterward became the pupil of the elder Dr. Shattuck, and while with him practised gratuitously among the poor at the west end of Boston. In addition to the required courses of the Harvard Medical School, he attended a full year’s course at the University of Vermont. After taking his medical degree at Harvard College in 1830, he established himself at Northfield, Mass., whence he removed to his native town, and thence, in 1837, to Louisville, Kentucky. Returning to Massachusetts in 1843, he took up his residence in Dorchester, which was his home for the remainder of his life.